tion to the passers by. Such was the sepulchre of the Scipios, as it is yet to be seen near the Porta St. Sebastiano. But towards the end of the Republic, when the luxury of marble began to be known, and governors of provinces returned home laden with the spoils of the east, the colossal taste in sepulchral monuments was introduced. The rich Crassus erected a mausoleum for his wife on the Via Appia, built of travertine stone, 24 feet thick; and every one who has visited the Campagna of Rome, will be familiar with the striking monument of Cecilia Metella. Forsyth observes, "the general form of the tombs on the Appian Way is a cylinder or a truncated cone with a cubic base and a convex top. This combination," he says, "conveys the idea of a funeral pyre, and has some tendency to the pyramid, the figure most appropriate to a tomb, as representing the earth heaped on a grave, or the stone piled on a military barrow." Perhaps Crassus was the first who broke through this general rule, when he gave more rotundity to his wife's monument. Caius Cestius went back to the pyramid, and these two monuments, which we may consider as belonging to the Republic, have now stood for nearly 2,000 years, and there seems no reason why they should not stand for 2,000 more.

But I come now to the two great sepulchres of Imperial Rome. Augustus chose for the site of his mausoleum a place in the Campus Martius, between the Via Flaminia and the Tyber. The remains of that monument are now to be seen behind the Palazzo Correa, near the Porto di Ripetta. The ancient walls are so concealed or involved with the surrounding buildings that its magnitude can hardly be estimated by the spectator. Strabo has given us some description of it, and he considered it the object most worthy of notice among the splendid edifices of the Campus Martius. It stood upon a lofty substruction of white stone, near the bank of the river, and it was shaded to the very top with evergreen trees. The summit was crowned by the statue of Augustus in bronze: the trees appear to have been planted on the belts of the stories, as the circumference contracted towards the top. Behind the mausoleum there was a grove laid out in walks, the care of which was committed to a procurator. The tomb was built twenty-seven years before the Christian era, and it is probable that the boy Marcellus was the first of the imperial family interred within its walls.

quum, Tyberine, videbis
Funera, cum tumulum præterlabere recentem!

It was in this tomb that Agrippa and Drusus were buried. And in the nineteenth year of the Christian era, Agrippina, in the midst of weeping crowds of citizens, brought the ashes of Germanicus to be placed within its walls. But the monument, which was designed by the first master of the Roman world to be the silent repository of the ashes of himself and his posterity, has come to an ignoble end. The ruins, which time and Robert Guiscard the Norman have left, are now consolidated into the platform of an amphitheatre; and in the summer months, several thousands of the Roman people sit round the ample circumference, to witness the horrors of a bull-fight, the feats of horsemanship, and the antics of a vagrant clown.

As if it were to show how little any works, however great, are valued, which have not some public object or utility, the colossal monument of Hadrian, which we are about to view, is hardly noticed by the ancient writers. But there is little doubt that the Emperor Hadrian himself was the architect of his own tomb: the whole of his life was dedicated to the arts, and he could ill brook a rival in the science on which he thought he excelled. Apollodorus, the great architect of that day, the man of taste, was doomed to view all the designs the Emperor sent to him, and to choose between praising what he could not admire, or going into exile. Apollodorus ended in the latter alternative, and left the imperial architect to construct his own mausoleum. Dion Cassius tells us, that when Hadrian was buried in the tomb he built on the bank of the Tyber, that of Augustus was full, and no more ashes could be deposited within it. But I apprehend that Hadrian had cast an emulous eye upon the great work of his predecessor, and perhaps chosen the garden of Domitia, nearly opposite, to confront with greater splendour the monument which Strabo had praised. The rich materials he had probably collected in his travels through the empire, and, I imagine, like those who built a still larger tower in the plains of Shinar, the vain notion of his mind might be expressed in the same language—"Come let us make us a name." Be this as it may, all that Spartian, the biographer of Hadrian, tells us about this stupendous work is, "Fecit et sui nominis pontem et sepulchrum juxta Tyberim." The bridge here mentioned is that which Hadrian erected across the Tyber to give an easy access to his tomb, and which he called Pons Elius, after his prenomen. There is a medal extant, which exhibits this bridge with three main arches in the middle, and at each end two of smaller dimensions. Much of the ancient construction of peperine stone still remains in the vaults of the arches, and with the name changed to Ponte S. Angelo, it preserves to this day the appearance of what it was originally.

It appears from various inscriptions that have been found and preserved, that this mausoleum received the ashes of all the Antonines; and the body of Commodus, after being dragged through the Tyber, was also buried in it by order of Pertinax. Something was left by Hadrian for his successors to finish, and it probably continued to be the imperial place of burial until the time of Septimus Severus; perhaps we may say until the middle of the third century. Then its history as a sepulchre ends. But, before I proceed to describe to you the original appearance and splendour of this monument of imperial Rome, let me bring together the few notices which are found of it in ancient writers. Procopius is the first who gives any description of what it was: in his account of an assault made by the Goths outside the Aurelian gate (it is not far from where the Gauls of 1848 very recently made their assault), he thus writes:—"The tomb of the Emperor Hadrian is situated outside the Porta Aurelia, about a stone's cast from the bulwarks of the city; it is an object worthy of admiration. It is built of Parian marble, and the blocks fit close to one another without any thing between to fasten them; it has four equal sides about a stone's throw in length; it rises above the city walls; on the top are statues of the same kind of marble, admirable figures of men and horses. The men of old time (that is the Romans, probably in the time of Honorius), joined this monument with the bulwarks of the city by two walls, because it appeared to be advantageous for the defence of the city; it thus became a part of the fortifications, and had the appearance of a lofty tower covering the entrance of the city." So far we learn that the mausoleum was converted at a very early period (for Procopius saw it in 534 A.D.) into a fortress. Those beautiful statues, however, which the secretary of Belisarius describes, were put to a strange use by the defenders of Rome. Instead of more appropriate missiles and more raw material, these master pieces of sculpture were torn from their pedestals and hurled upon the besiegers below; and perhaps the breaking of the head of a Goth might cost a whole Venus or a Mars, a head of a Faun, or a foot of Hercules. I do not know what to say of a passage cited by Salmasius from John of Antioch, who lived A.D. 620. "The figure of Hadrian," he says, "stood on the top in a car drawn by four horses, of such colossal dimensions, that a full grown man might pass through one of the horse's eyes." A chronicler of the thirteenth century, commonly called the anonymous, says that the tomb was faced with marble, and he talks of gilded peacocks and a bull. The same mediæval sight-seer mentions also bronze doors and horses, which he saw about the mausoleum. But the earliest representation or drawing we have of the Mole is that now existing on the bronze doors of St. Peter's, made in the days of Pope Eugenius, by Antonio Pollagio, about 1481. In Camucci's sketch, made a century later, some of the cornice is indicated, which he must have seen, and which he says was embellished with ox heads and festoons; and on the frieze there were two inscriptions then to be seen belonging to Commodus and Lucius Verus. Pope Clement VII. and his architect Labacco gave currency to the tradition, that the beautiful columns of Paonazzetto, which stood in St. Paul's Basilica, once adorned the upper stories of this mausoleum. Now with these notices of historians and artists of old time, added to our own observations of its present state, we are to make the description, both external and internal, of this durable monument.*

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TUBULAR GIRDER BRIDGES.

INSTITUTION OF CIVIL ENGINEERS.

On the 12th, the president in the chair, a paper was read, "On Tubular Girder Bridges," by Mr. Wm. Fairbairn. The author commenced by stating, that the chief points to be taken into consideration were:—1st, the application of a given formula, for computing their strength; 2nd, the excess of strength that should be given, over the greatest load that could be brought upon the bridge; and, 3rd, the effects of impact, with the best mode of testing the strength, and proving the security of the bridge.

In the first place, it had been determined by experiments, that, in order to balance the two resisting forces of tension and compression, in a wrought-iron tubular girder, having a cellular top, the sectional area of the bottom should be to the sectional area of the top, as eleven to twelve; and that until this proportion existed, the usual formula could not be applied; this formula was, that the breaking weight was equal to the total area, multiplied into the depth, and into a constant (30), and divided by the length of the girder. $\left(w = \frac{a\,d\,e}{l}\right)$

Considering the particular case of the Torksey bridge, the mean sectional areas of the top and the bottom, being respectively 51·03 square inches and 54·93 square inches, the latter was in excess of strength over the former, so that a reduction of the area of the bottom from 54·93 to 46·76 square inches might have been made with propriety, and would have been in conformity with the formula.

By calculation, the ultimate strength of the bridge was found to be 1,152 tons, whilst the greatest total load, including the weight of the girders, &c., was only 372 tons. This gave a strength greater than the heaviest rolling load that could be brought on the bridge, in the proportion of nearly five to one. Although, therefore, the proportion of the girders was not exactly that which the author recommended, he considered that "they were, nevertheless, sufficient to render the bridge perfectly secure." This conclusion was arrived at without taking into consideration the amount of additional strength derived from the continuity of the girders across the central pier.

The exact proportions recommended were given in two tables extending respectively to spans of 150 feet and of 300 feet. The depths of the girders of the first class were taken at one-thirteenth of the span, and those of the second class at one-fifteenth of the span.

In the discussion which followed the definite proportions assigned in the paper for girders were disputed, and the attempt to assign empirical rules for the practice of engineers, in structures of this novel character, was earnestly deprecated.

PROVINCIAL.—A market house is to be erected at Cinderford, Forest of Dean, cost payable in 20 shares, of 50*l.* each.——The foundation stone of St. Matthias's Church, on the Weir, says the *Bristol Journal*, was laid on Thursday, in last week. It is to be in the Decorated style, with accommodation for 842 sitters, 634 free, and all with open seats. The architect is Mr. John Norton, and the builders are Messrs. Willcox and Sons, who have contracted to erect the edifice in eighteen months. ——Mr. Macbride, the sculptor, says a Liverpool paper, is engaged on a historical group from British history, to be executed in marble, for the International Exposition.——A number of Mr. Ebenezer Elliott's admirers have expressed a desire that a monument should be erected to his memory in or near Sheffield. ——Resolutions have been passed by the Knaresborough Improvement Act Commissioners, for carrying out a complete plan of drainage in that town. A committee visited Ripon, to pick up a few hints, as the neatness, cleanliness, and healthfulness of that town has been with good reason attributed to the completeness of its drainage: not a single case of cholera occurred in that town.

* To be continued.